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Design Data
Performance
Physical Characteristics
Weapon Characteristics

This report

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Describes procedures for uniform collection of physical characteristics of guns and howitzers, mortars, small arms, recoilless rifles, and small rocket launchers.

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US ARMY TEST AND EVALUATION COMMAND
TEST OPERATIONS PROCEDURE

DRSTE-RP-702-102
*Test Operations Procedure 3-2-500 9 November 1981
AD No.

WEAPON CHARACTERISTICS

1. SCOPE. This TOP lists all of the physical characteristics (as defined in AR 310-25[1])** to be obtained during testing of guns, howitzers, mortars, small arms, recoilless rifles, and small rocket launchers, undergoing Developmental Test II, as prescribed in AR 70-10.[2] It also provides guidance for developing characteristics data sheets.

Inspections and measurements of cannon are contained in TOP 3-2-800[3], and physical characteristics of Army aircraft armament are covered in TOP/MTP 7-1-004.[4]

2. FACILITIES AND INSTRUMENTATION.

2.1 Facilities.

ITEM	REQUIREMENT
Maintenance shop facilities	
Cameras	movie and still; color and b/w
Hardstand	level and smooth

*This TOP supersedes TOP/MTP 3-2-500 dated 5 June 1971.

**Footnote numbers correspond to reference numbers in Appendix A.

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2.2 Instrumentation.

ITEM	MAXIMUM PERMISSIBLE ERROR OF MEASUREMENT*
Calipers (including Vernier) inside and outside	±0.003 cm
Micrometers, required sizes	±0.025 mm
Scales, weighing and linear measuring, required sizes	±1% of reading
Tape measure	

3. PREPARATIONS FOR TEST. As soon as possible after a weapon is received, prepare a comprehensive checklist of physical characteristics, based on referenced documents, engineer design drawings, and technical manuals provided with the test item. In listing these characteristics, make sure any details that have a security classification higher than that of the project as a whole are excluded. Identify any Government-furnished equipment that will not be evaluated.

Obtain the nomenclature from technical manuals and engineer design drawings. If the nomenclature is incomplete, use that contained in the Federal stock catalogs or professional publications.

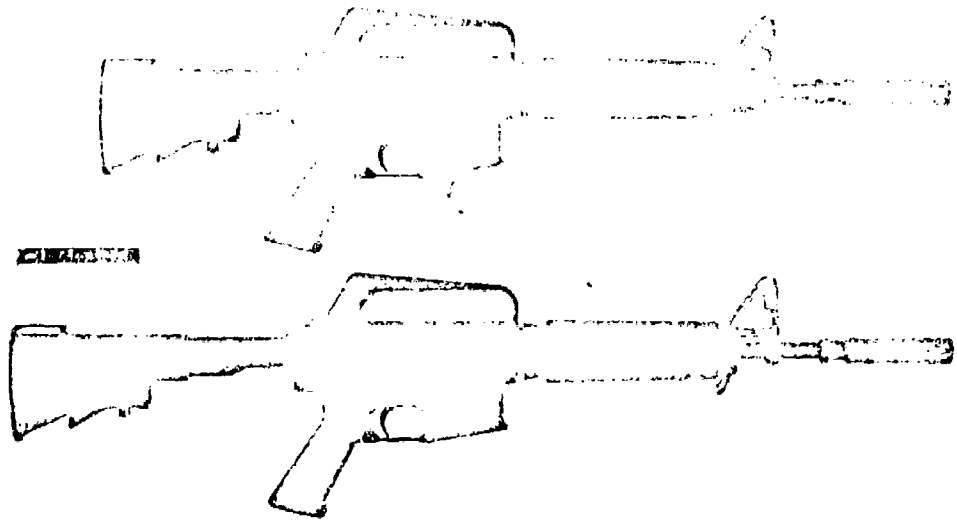
3.1 Characteristics Data Sheet. Prepare this sheet (see Figure 1) to use as a reference during a test. The characteristics data sheet consists of a page containing a photograph of the test item and a list of its principal dimensions and functional characteristics. After all characteristics have been confirmed (and the sheet corrected), it becomes part of the test report.

The data should include, but not be limited to, all characteristics that are applicable to the weapon or component. Any preliminary design data or tentative characteristics (to be confirmed during the test) must be identified as such on the data sheet.

The type of photograph depends on the depth of coverage desired (i.e., complete weapon or component). The photograph should be as large as possible (to preserve clarity after reduction) with unnecessary background features eliminated as much as possible. For artillery or mounted small arms weapons, a 3/4 view is usually the most effective, with the artillery piece shown at a slight elevation (see Figure 2). For mortars, recoilless rifles, rocket and missile launchers, use separate sheets to depict the ground- and carrier-mounted applications. An exploded view of a component (see Figure 3) may be appropriate.

Adequate characteristic listings, when published in a formal report, include all significant engineering and performance data, along with all physical attributes that affect the military value of the weapon.

*Values may be assumed to represent ± 2 standard deviations; thus, the stated tolerances should not be exceeded in more than 1 measurement of 20.



SUBMACHINE GUN, 5.56-MM, XM177E2

Weight of weapon	6.2 lb
Weight of weapon with sling and loaded 20-round magazine	7.2 lb
Length (over-all)	29.7 in.
Length (over-all) with buttstock extended	33.0 in.
Length of barrel (from muzzle end of flash suppressor to face of bolt)	15.4 in.
Length of barrel (from muzzle end of barrel to face of bolt)	11.6 in.
Operation	Gas-operated, front-locking rotary bolt
Rifling	One turn in 12 in.
Muzzle velocity	2780 fps
Type of fire	Semi- and full automatic
Stock	Telescoping buttstock
Ammunition	5.56-mm, M193 ball and M196 tracer

Figure 1. Characteristics Data Sheet.

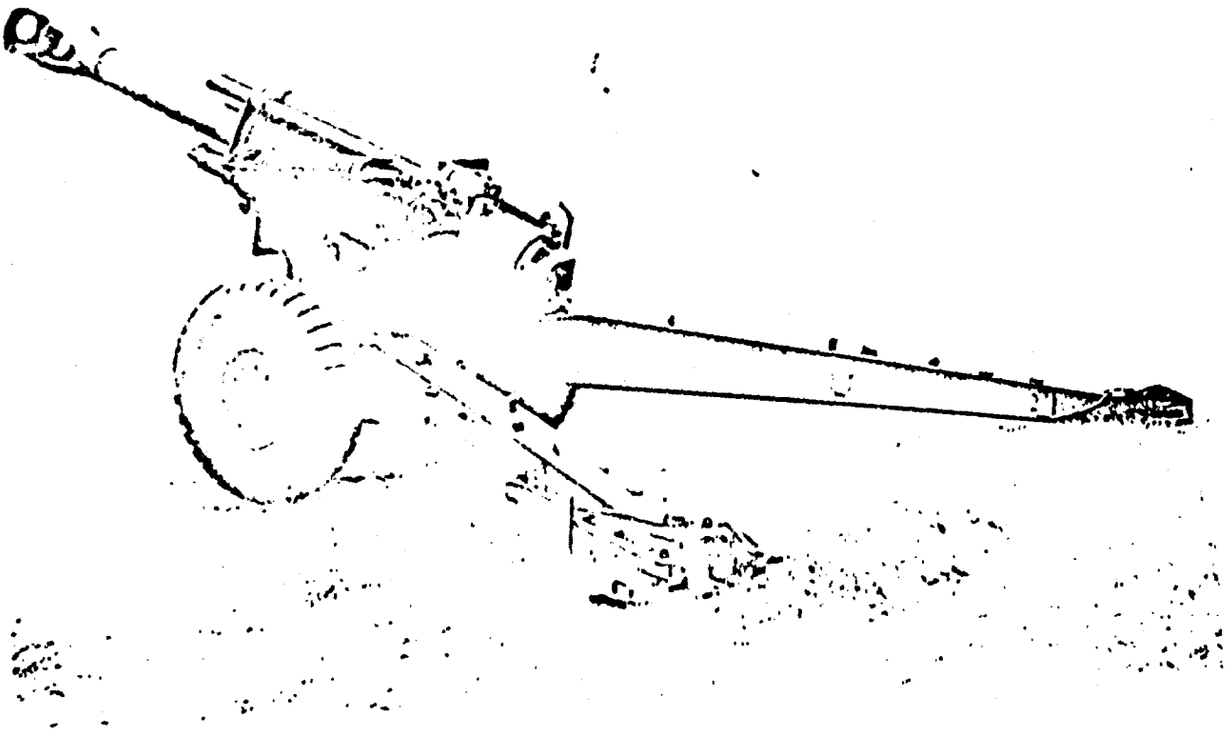


Figure 2. General View of an Artillery Weapon.

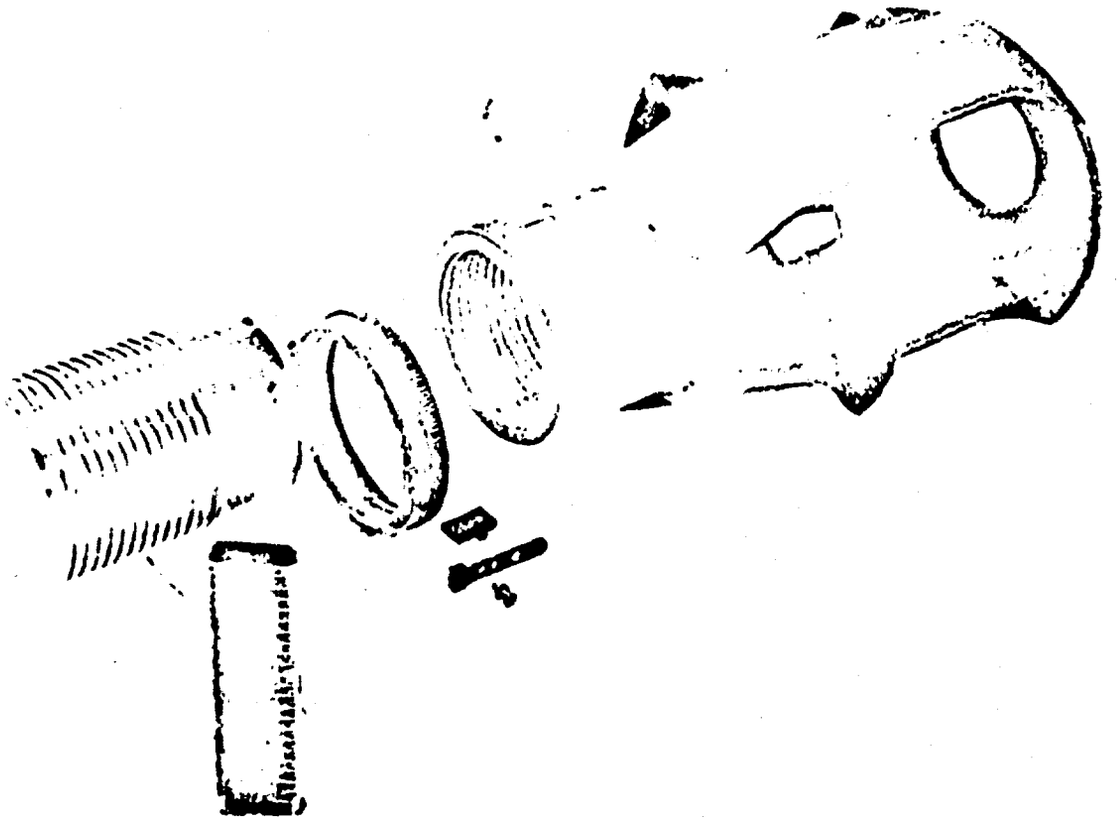


Figure 3. Exploded View of an Artillery Weapon Component.

4. DATA TO BE COLLECTED.

4.1 Pre-Test Data.

a. Weigh, measure, and photograph the completely assembled test item, as well as its components, interfacing parts, and ancillary items. (Include a scale in all photographs.)

b. Repeat step a with the test item disassembled to minimum dimensions, if applicable.

c. Determine the center of gravity, if applicable, in accordance with TOP 2-2-800.[5]

d. Record the physical characteristics, including control markings or instruction plates, on the appropriate prepared checklist. NOTE: If the test item does not meet criteria for particular measurements, include in the test report an objective analysis for recommending further development, when necessary, or a subjective analysis, based on technical or military experience and judgment, of the effect this would have on the overall technical performance of the test item.

e. Record data on characteristics data sheet (see Figure 1).

4.2 Required Weapon Characteristics. Record the following, as appropriate, and if information is available; additional data may be included:

4.2.1 Howitzers, Guns, and Recoilless Rifles:

a. Nomenclature, serial and model numbers, and manufacturer
b. Weapon:

Caliber
Weight
Length, overall
Center of gravity
Length of bore (in calibers for howitzers and guns; in mm for recoilless rifles)
Number of lands and grooves
Rifling twist
Projectile travel distance in tube
Ammunition used
Muzzle velocity
Volume of chamber
Type of breech mechanism
Type of firing mechanism
Rate of fire, rapid and sustained
Any firing temperature limitations placed on the weapon/ammunition
Maximum effective range

For howitzers and guns, also record:

Upper pressure limit for propellant proof
Permissible individual maximum pressure
Muzzle attachments
Type of loading

For recoilless rifles, also record:

Width, overall
Height, overall
Permissible individual maximum pressure
Diameter of tube or barrel
Vent size
Maximum permissible recoil force
Fire control equipment

c. Recoil mechanism of howitzers and guns:

Type
Total weight
Normal and maximum recoil length
Maximum piston rod pull
Weight of recoiling parts
Cycle times
Precharge pressures

d. Carriage of howitzers and guns:

Total weight, with and without weapon
Height of lunette, limbered
Width of carriage, overall
Tread width
Trail spread
Maximum elevation and depression
Maximum traverse right or left
Road clearance
Time required to emplace and disemplace
Total length, with weapon
Height of trunnions above ground (emplaced)
Distance from centerline of trunnions to muzzle
Loading angles
Type of firing support
Type of brakes and wheels
Type and size of tires
Maximum height above ground (emplaced)
Equilibrator type and number
Fire control equipment

4.2.2 Mortars:

a. Nomenclature, caliber, serial and model numbers, and manufacturer
b. Weapon:

Length, overall, including basecap
Length of tube
Maximum range
Permissible individual maximum pressures
Method of loading and firing
Temperature limitation
Ammunition used
Mount type
Baseplate type

Weights: mortar w/basecap, complete mount, and baseplate
Rate of fire, rapid and sustained
Emplacement/disemplacement time
Fire control equipment

4.2.3 Rocket or missile launcher:

a. Nomenclature, serial and model numbers, and manufacturer
b. Weapon:

Length, overall
Length of tube
Number of tubes
Width, overall
Height, overall, travel and emplaced
Weight, overall
Height of trunnions above ground (emplaced)
Firing mechanism
Fire control
Mounting
Ammunition used
Maximum elevation and depression
Maximum traverse, right or left
Type and size of wheels and tires
Type of brakes
Emplacement/disemplacement time
Maximum effective range
Rate of fire

4.2.4 Small Arms and Automatic Weapons:

a. Nomenclature, serial and model numbers, and manufacturer
b. Weapon:

Caliber
Weight, with and without magazine/accessories
  Empty and loaded
Length, overall
Rifling length
  Number of lands and grooves
  Pitch and direction
Sight radius and type
  Range graduations, if applicable
Barrel length
  With and without muzzle brake/suppressor, as applicable
Muzzle velocity
Maximum effective range

For handguns:

Type of operation
  Breech lock
    Type (single/double action, toggle, tilting barrel, etc.)

Firing position (open, closed)
Type of fire (semi- or fully automatic; automatic fire cyclic rate)

For rifles:

Weight
Bayonet
Sling
Grenade launcher
Bipod
Cleaning kit
Length
With and without bayonet
Without bayonet, stock folded/retracted
Type of operation
Breech lock
Type (rotating bolt)
Firing position (closed)
Type of fire (semi- or fully automatic; automatic fire cyclic rate)

For machine guns:

Type of operation
Breech lock
Type (tilting, block, etc.)
Firing position (open, closed)
Assembly (quick change, fixed headspace)
Whether magazine- or belt-fed
Direction of feed, if belt-fed
Type of fire (automatic fire cyclic rate)
Type of firing position

Recommended changes of this publication should be forwarded to Commander, US Army Test and Evaluation Command, ATTN: DRSTE-AD-M, Aberdeen Proving Ground, Md. 21005. Technical information may be obtained from the preparing activity: Commander, US Army Aberdeen Proving Ground, ATTN: STEAP-MT-M, Aberdeen Proving Ground, Md. 21005. Additional copies are available from the Defense Technical Information Center, Cameron Station, Alexandria, Va. 22314. This document is identified by the accession number (AD No.) printed on the first page.

APPENDIX A
REFERENCES

1. AR 310-25, Dictionary of US Army Terms (Short Title: AD), 15 September 1975.

2. AR 70-10, Test and Evaluation During Development and Acquisition of Materiel, 29 August 1975.

3. TOP 3-2-800, Schedules for Inspections and Measurements of Cannon, 6 January 1976.

4. TOP/MTP 7-1-004, Army Aircraft Armament, 3 June 1970.

5. Test Operations Procedure 2-2-800, Center of Gravity, 18 July 1980.